

Patent Claims

1. Method for splitting flat ceramic workpieces through provocation of a separation crack due to stresses occurring as a result of temporal and local application of heat by means of laser along a desired splitting line and, following this, a temporal and local removal of heat by means of a coolant, wherein the laser radiation forms a beam spot on the workpiece, the length of the beam spot in the direction of the splitting line being greater than the width of the beam spot perpendicular to the splitting line, wherein the beam spot length is so adjusted depending upon the thermal conductivity of the workpiece and the material thickness of the workpiece that it is as small as necessary for achieving the required temperature gradient for generating the splitting crack in spite of thermal conduction but is also as large as possible in order to achieve the fastest possible introduction of heat and, therefore, a high process speed.

2. Method according to claim 1, characterized in that the beam spot length is calculated from the following formula:

$$l = 8 \times d \times 24 / WLF,$$

where l is the length of the beam spot, WLF is the thermal conductivity of the ceramic to be split, and d is the thickness of the ceramic workpiece to be split.

3. Method according to claim 1 or 2, characterized in that no initial crack is generated for initiating the splitting process.

4. Method according to one of claims 1 to 3, characterized in that the internal stresses of the workpiece along the desired splitting line are determined before the start of the splitting process and the output or the speed is so controlled in a spatially-oriented manner during the splitting process while taking into account the internal stresses that the thermal stresses and the internal stresses along the splitting line, in sum, achieve the breaking stress needed for crack formation.

5. Method according to claim 1 or 2, characterized in that the workpiece is held on a workpiece support accompanied by pretensioning in order to generate additional stresses reinforcing the process stresses.

6. Method according to one of claims 1 or 2, characterized in that the workpiece is fixed to the workpiece support, on which the workpiece is also held in the same manner during the splitting process, for measuring the internal stress.